Areas 4 and 5 - Phase II Soil Characterization
McDonnell Douglas Realty Company
C-6 Facility
Los Angeles, California

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AREAS 4 AND 5 - PHASE II SOIL CHARACTERIZATION
MCDONNELL DOUGLAS REALTY COMPANY C-6 FACILITY
LOS ANGELES, CALIFORNIA

EXECUTIVE SUMMARY

This report discusses the Phase II Soil Characterization for Areas 4 and 5 of the McDonnell Douglas Realty Company (MDRC) C-6 Facility (Facility) located in Los Angeles, California. The characterization was completed under the oversight of the Los Angeles Region of the Regional Water Quality Control Board (RWQCB) as the lead agency, with input from the Department of Toxic Substance Control (DTSC). The Areas 4 and 5 report is one of a series of reports that cover the Facility. The report sections include:

1.0 Introduction

Section 1.0 describes Areas 4 and 5 and discusses the purpose of the investigation.

2.0 Areas 4 and 5 Description

Section 2.0 provides a brief history of the Facility, with particular emphasis on Areas 4 and 5. Hydrogeologic setting is summarized, based on published reports and previous work, and geologic units identified from the Phase II Soil Characterization are described.

3.0 Program Design

Section 3.0 presents a detailed description of the soil characterization program. It discusses the historical use of each area of Areas 4 and 5 and explains the rationale used in determining the analytical program.

4.0 Soil Sampling and Analytical Methods

Section 4.0 describes the soil sampling program, including drilling, sampling and analytical methodology, chain of custody, and QA/QC program.

5.0 Investigation Results

Section 5.0 discusses the results from each area and presents findings in tables and figures. The complete laboratory reports are provided in appendices to the report.

6.0 Conclusions

Section 6.0 summarizes the conclusions resulting from the investigation.

7.0 References Cited

Section 7.0 presents a list of references cited throughout the report.

PURPOSE

The purpose of the Phase II Soil Characterization of Areas 4 & 5 was to characterize the nature of the soils and to identify areas of concern. These data will provide support to develop a risk assessment, to plan future groundwater investigations, and for future feasibility studies and possible soil remediation. The soil characterization included the physical properties of the soils, the subsurface distribution of the soil types, and the nature and extent of any chemicals of concern (COCs) within the soils.

LOCATION AND DESCRIPTION OF AREAS 4 AND 5

The Facility is located at 19503 South Normandie Avenue in Los Angeles, California (Figure 1). The Facility is bordered on the north by West 190th Street, on the east by railroad tracks and South Normandie Avenue, on the south by Montrose Chemical and residential properties, and on the west by Western Avenue, Capitol Metals, and International Light Metals (ILM).

Areas 4 and 5 occupy approximately 47 acres of the C-6 Facility. Area 4, comprising approximately 4 acres, is the driveway between Building 66 and the eastern border of the C-6 Facility. The driveway is about 1,650 feet long, trending north-south, 90 feet wide, and supports shipping and receiving operations occurring on the north side of Building 66. Area 5, occupying approximately 43 acres, encompasses the central portion of the C-6 Facility from Building 1 to the western border (Figure 2). The area includes Buildings 1, 32, 29, and 20 east of Denker Avenue, and all of the small buildings west of Denker Avenue between the northwest and southwest parking lots.

GEOLOGY AND HYDROGEOLOGY

Hydrogeologic setting of the Facility was determined mainly from reference to reports published by the U.S. Geological Survey and the California Department of Water Resources. The Facility is at about 50 feet mean sea level (MSL) elevation on the Torrance Plain, a Pleistocene-age marine surface. Near-surface sediments underlying the Facility are assigned to the Lakewood Formation and include marine and continental deposits of late Pleistocene age. Aquifers underlying the Facility include the Semiperched and Gage Aquifers within the Lakewood Formation and the Lynwood and Silverado Aquifers in the deeper San Pedro Formation. Previous groundwater investigations and monitoring at the Facility established that the uppermost groundwater is at 60 to 70 feet depth in the Semiperched Aquifer, with a hydraulic gradient to the south-southeast, measured at 3.5 feet per mile in late 1996.

Fifteen continuous core borings were drilled throughout the Facility (Figure 1A). Extensive information regarding the soils within 50 feet below the ground surface (bgs) at the Facility was developed from the drilling and geologic logging in the Phase II Soil Characterization. Four distinct subsurface units were identified (Q1 through Q4). Three of these soil units correlated over the entire Facility (Q1, Q2, and Q3), while the fourth (Q4) pinches out on the northwest and dips below the depth drilled on the east. The uppermost soils at the Facility consist predominantly of clay and silt. These fine-grained soils are present to about 22 feet bgs on the west and thicken to about 45 feet on the east. Soils below these depths are predominantly sand and silty sand to the 50-foot maximum depth drilled.

FIELD PROGRAM

A Field Sampling Plan was developed based on the findings of the Phase I environmental site assessments of the Facility. The Plan identified the individual areas of potential concern and reviewed the history of the areas. Based on these data, specific analytical testing was proposed at each location. The Plan was reviewed and approved by the RWQCB and DTSC.

Fifty soil borings were drilled and 186 soil samples were collected for analysis in the locations investigated for the Phase II Soil Characterization of Areas 4 and 5. The soil borings were drilled with either direct hydraulic-push or hollow-stem auger drilling methods. Borings to 10 feet and 25 feet bgs were drilled and sampled by direct-push methods. Borings to 50 feet bgs were drilled by hollow-stem auger.

All soil samples were analyzed for volatile organic compounds (VOCs) by EPA Methods 8260 and/or 8010/8020. Samples from all but two borings were analyzed for total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1. Selected additional analyses were performed on an area-by-area basis and include Title 22 metals, including hexavalent chromium (EPA Methods 6010, 7196, and 7471), semivolatile organic compounds (SVOCs) (EPA Method 8270), polychlorinated biphenyls (PCB) (EPA Method 8080), pH (EPA Method 9045), and cyanide (EPA Method 9010). Most of the samples were first analyzed on site for VOCs and TRPH by

state-certified mobile laboratories. If these initial analyses indicated total VOC concentrations exceeding 200 micrograms/kilogram (µg/kg), the samples were also analyzed in a state-certified stationary laboratory for confirmation. As an additional quality assurance (QA) check, the offsite stationary laboratory also analyzed 10 percent of the samples for which the mobile laboratory reported VOCs and TRPH as not detected.

SUMMARY OF FINDINGS

Area 4, the driveway east of Building 66, was not divided into areas for separate investigation. Area 5 was divided into the following nine areas of potential concern which were investigated individually:

- Building 15, Photo Lab
- Border with International Light Metals
- Open Space west of Denker Avenue
- Building 20, Auto Repair Shop
- Salvage Area Behind Building 32
- Building 1, Paint Booth
- Building 1, Dip Tank Area
- Building 1, Basement
- Area Between Buildings 1 and 2

Of these areas of potential concern investigated in Areas 4 and 5, only Building 20 was found to contain COCs at levels such that they were designated areas of concern. The results of the study at Building 20 and other notable findings are summarized below.

Building 20

Several soil samples collected from the Building 20 borings were impacted with petroleum hydrocarbons. Gasoline was detected in three samples with the concentrations ranging from 300,000 µg/kg to 5,100,000 µg/kg. The gasoline impact

detected in the 1-foot bgs sample from boring 2BB-5-13 appears to be limited in extent because it was not detected in the samples from the nearby borings 2BB-5-14 and 2BB-5-12, nor was it detected in deeper samples from boring 2BB-5-13. The gasoline detected in the 7-foot and 10-foot bgs samples from boring 2BB-5-16 appears to be limited in vertical extent because the 15-foot sample did not contain detectable concentrations of gasoline. The lateral extent of the gasoline impact, however, is not well constrained around boring 2BB-5-16. TRPH was also detected in shallow samples from borings 2BB-5-12, 13, 14, 16, 17, and 19 in concentrations ranging from 14 mg/kg to 23,000 mg/kg. TPH motor oil was detected in shallow samples from borings 2BB-5-16, 17, and 19 in concentrations no greater than 1,200 mg/kg. TPH diesel was detected in the 7-foot and 10-foot samples from boring 2BB-5-16 at 18,000 and 15,000 mg/kg, respectively.

Area 4

Analysis of the results of the Phase II Soil Characterization indicated Area 4, the driveway between Building 66 and the eastern border of the C-6 Facility, is not an area of concern. While petroleum hydrocarbons were found in many of the samples collected from this area, the detections occurred in shallow samples, and the concentrations were no greater than 430 mg/kg. This area did not contain petroleum hydrocarbons in concentrations, distribution, or frequency of occurrence to be designated as an area of concern.

Border with International Light Metals

Low concentrations of trichloroethene (TCE) were detected in the 40-foot sample and the 50-foot sample from borings 2BB-5-3 and 2BB-5-4, respectively. The presence of TCE in these samples is consistent with the findings of other soil borings along the border which are described in the Parcel A Phase II Soil Characterization report (Kennedy/Jenks, 1997). The TCE may have migrated from documented sources of TCE impact on the adjacent ILM property.

Building 1, Basement and Paint Booth

The soil beneath the basement of Building 1, particularly the eastern and northeastern parts, has been impacted with VOCs including TCE, 1,1-dichloroethene (1,1-DCE), and tetrachloroethene (PCE). The impacts observed in the basement and paint booth borings appear to be the result of releases centered around Building 36 to the north. The results of investigation in the area of Building 36 are described in the Phase II Soil Characterization Report for Parcel A (Kennedy/Jenks, 1997c).

Salvage Area Behind Building 32

Samples collected from boring 2BB-5-20, located in the salvage area north of Building 32, contained petroleum hydrocarbons. While the 1-foot sample contained TRPH at 9,100 mg/kg, the 4, 10, and 30-foot samples contained TRPH no greater than 15 mg/kg. In addition, the 1-foot sample contained arsenic at a concentration of 170 mg/kg as well as low concentrations of cadmium and lead. This area did not contain petroleum hydrocarbons or metals in concentrations, distribution, or frequency of occurrence to be designated as an area of concern.

None of the other areas of potential concern investigated in Area 5 were found to contain COCs at concentrations, frequency, or distribution such that they were designated areas of concern.

1.0 INTRODUCTION

Kennedy/Jenks Consultants performed a Phase II Soil Characterization of the McDonnell Douglas Realty Company (MDRC) C-6 Facility (Facility) under Contract No. 97-007TO, dated 21 February 1997. A Field Sampling Plan (FSP) was prepared for the soil characterization and reviewed and approved by the Regional Water Quality Control Board, Los Angeles Region (RWQCB), the lead agency; the Department of Toxic Substance Control (DTSC); and the Office of Scientific Affairs (OSA).

This section provides a description of the general location of the Facility and Areas 4 and 5 of the Facility. The Section also presents the purpose of the Phase II Soil Characterization program.

1.1 C-6 Facility Location

The Facility is approximately 170 acres, located at 19503 South Normandie Avenue in Los Angeles, California (Figure 1). The Facility is bordered on the north by West 190th Street, on the east by railroad tracks and South Normandie Avenue, on the south by Montrose Chemical and residential properties, and on the west by Western Avenue, Capitol Metals, and International Light Metals (ILM).

Areas 4 and 5 occupy approximately 47 acres of the C-6 Facility. Area 4, comprising approximately 4 acres, is the driveway between Building 66 and the eastern border of the C-6 Facility. The driveway is about 1,650 feet long, trending north-south, 90 feet wide, and supports shipping and receiving operations occurring on the north side of Building 66. Area 5, occupying approximately 43 acres, encompasses the central portion of the C-6 Facility from Building 1 to the western border (Figure 2). The area includes Buildings 1, 32, 29, and 20 east of Denker Avenue, and all of the small buildings west of Denker Avenue between the northwest and southwest parking lots.

1.2 Purpose

The purpose of the Phase II Soil Characterization was to identify and characterize the nature of the soils above groundwater, potential areas of concern throughout the Facility, including Areas 4 and 5, and to support the ongoing risk assessment. The soil

characterization included the physical properties of the soils, the subsurface distribution of the soil types, and the nature and extent of Chemicals of Concern (COCs) within the soils.

2.0 AREAS 4 AND 5 DESCRIPTION

This section provides a history of the Facility and a description Areas 4 and 5. This section also presents a discussion of the regional and local geology and hydrogeology.

2.1 Description and History of Areas of Investigation

A review of aerial photographs indicated that the Facility was farmland prior to the 1940s (Kennedy/Jenks Consultants, March 1996). The Facility was first developed by the Defense Plant Corporation in 1941, as part of an aluminum reduction plant. The plant was operated by the Aluminum Company of America until late 1944 (Camp, Dresser & McKee, 1991). In 1948, the property was acquired by the Columbia Steel Company. In March 1952, the U.S. Navy purchased the property from the Columbia Steel Company and established Douglas Aircraft Company (DAC) as the contractor and operator of the Facility for the manufacturing of aircraft and aircraft parts. DAC purchased the Facility from the Navy in 1970 (Camp, Dresser & McKee, 1991). The Facility was transferred to MDRC in 1996.

Areas 4 and 5 were investigated based on potential areas of concern and to support the ongoing risk assessment. The discussions that follow focus on the general uses of each area. Section 3.0 discusses the historical use of each building and potential area of concern within Areas 4 and 5 based on Phase 1 environmental site assessments conducted by Kennedy/Jenks Consultants in March 1996 and May 1997.

2.2 Regional Geology And Hydrogeology

The geology and hydrogeology of the region surrounding the Facility were determined mainly from reference to reports published by the U.S. Geological Survey (USGS) (Poland and others, 1959) and the California Department of Water Resources (DWR, 1961). Reference also was made to previous reports prepared by Kennedy/Jenks Consultants for the Facility.

The Facility is located on a broad plain at an elevation of about 50 feet MSL. The DWR and USGS define this area as the Torrance Plain, a Pleistocene-age marine surface and a subdivision of the Coastal Plain of Los Angeles and Orange Counties. The ground

surface in this area is generally flat with an eastward gradient of about 20 feet per mile (less than one-half percent). Surface drainage is generally toward the Dominguez Channel, about a mile to the east. The Dominguez Channel, in turn, flows southeastward toward the Los Angeles and Long Beach Harbors in San Pedro Bay.

The surface sediments in this area are assigned to the Lakewood Formation (DWR, 1961), a unit defined to include essentially all of the upper Pleistocene sediments in the Los Angeles Coastal Plain area. The Lakewood Formation includes deposits of both marine and continental origin, representing stream transport and sedimentation along the Pleistocene marine plain. In the Facility area, the Lakewood Formation may include the Semiperched Aquifer, the Bellflower Aquiclude, and the Gage Aquifer. The Semiperched Aquifer includes deposits described as Terrace Cover (Poland and others, 1959). Extent and thickness of this unit is not rigorously defined, but appears to include the near-surface water-bearing units in the area of the Facility. The Bellflower Aquiclude is described as a heterogeneous mixture of continental, marine, and wind-blown sediments, mainly consisting of clays with sandy and gravely lenses (DWR, 1961). The base of the Bellflower Aquiclude is about 100 feet below sea level (about 150 feet bgs) in the Facility area. The Gage Aquifer is a water-bearing zone of fine to medium sand and gravel confined by the Bellflower Aquiclude. It is reported to be about 40 feet thick in the Facility area and is described as being of secondary importance as a water source (DWR, 1961).

The Lakewood Formation is underlain by the Lower Pleistocene San Pedro Formation, which continues to about 1,000 feet in depth in the Facility area. Major water-bearing zones within the San Pedro Formation are the Lynwood Aquifer and the Silverado Aquifer. These are reported to be at depths of about 300 and 500 feet, respectively, in the Facility area (DWR, 1961). The Silverado is an important groundwater source in the Coastal Plain and is considered a source of drinking water (DWR, 1961).

2.3 Local Geology And Hydrogeology

2.3.1 Local Geology

The drilling program conducted during the Phase II Soil Characterization provided extensive information with regard to the sediments within the upper 50 feet at the Facility. The drilling program included 36 hollow-stem auger borings and 174 direct-push probes, totaling approximately 4,700 linear feet. The drilling program for Areas 4 and 5 included 4 hollow-stem auger borings and 46 direct-push borings totaling about 826 linear feet. Boring locations are shown on Figure 2 and boring logs are in Appendix A.

To allow detailed examination of the subsurface soils, 15 borings at various locations within the Facility were continuously sampled from the surface to 50 feet bgs (Figure 1A). The detailed logs from some of these borings were used to construct the generalized cross-sections that are presented in Figures 3 through 5. Logs from the other, shallower borings are consistent with the soil units shown on the generalized cross-sections.

Several distinctive soil units were recognized in the subsurface and can be correlated between borings, as shown on Figures 3 through 5. For convenience in this text, the subsurface soil units are informally designated Units Q1 through Q4.

Unit Q1: Unit Q1 is a layer of silty clay and sandy clay encountered at the surface or just below the pavement or engineered fill soils over the entire Facility. This clay is typically dark brown to dark reddish brown in color and medium stiff to hard. It has moderate to high plasticity and is classified as CL or CH under the Unified Soil Classification System (USCS). Unit Q1 has a uniform thickness of about 5 feet along the west side of the Facility. It thickens to about 22 feet on the northeast corner of the Facility.

Unit Q2: Unit Q2 comprises a sequence of interbedded clayey silt, fine sandy silt, and fine silty sand with minor lenses of silty clay. The predominant USCS classifications are ML and SM. The Unit Q2 soils are brown, olive brown, and reddish brown in color and are generally medium dense. Unit Q2 is about 17 to 20 feet thick and the base is about

22 to 25 feet bgs along the west side of the Facility. The unit thickens to about 30 feet at the east side of the Facility. The base of Unit Q2 also slopes eastward, and occurs at depths of 45 to 50 feet along the east side of the Facility.

Unit Q3: Unit Q3 is an interval of fine and very fine sand with only minor silt. Soils in this interval generally are classified as SP and SP-SM under the USCS. This soil unit includes distinctive beds containing abundant shell fragments. The sand is mainly light yellowish brown to light yellowish gray in color. It has generally massive structure, and commonly is described as being similar to beach sand. The sand is generally dense, but has essentially no cohesion.

Unit Q3 is more than 28 feet thick on the west side of the Facility, extending from about 22 feet bgs to below the 50-foot depth drilled at the northwest corner of the Facility. However, in the southern part of the Facility, Unit Q3 is interlayered with Unit Q4, a wedge of fine silty sand and fine sandy silt.

Unit Q4: Unit Q4 was observed in borings in the southwestern and central part of the Facility. It pinches out in the northwestern part of the area and is likely below the depth drilled on the east. Maximum thickness of this soil unit is about 17 feet, on the southwest. Unit Q4 mainly contains fine silty sand (SM) and clayey silt (ML) with thin interbeds of silty clay and fine sand. These soils are generally yellowish brown in color and are medium dense to dense.

2.3.2 Local Hydrogeology

Groundwater conditions at the Facility are known from previous investigations and from the quarterly groundwater monitoring program (Kennedy/Jenks Consultants, 1997a). Groundwater samples from 15 observation wells at the Facility have been sampled and analyzed on a quarterly basis since 1992. The drilling for the Phase II Soil Characterization was entirely in the unsaturated zone and did not provide additional information on groundwater.

The uppermost groundwater at the Facility appears to be under water-table conditions at depths of 60 to 70 feet. Regionally, this uppermost groundwater is probably considered

part of the Semiperched Aquifer discussed previously and is separated from the deeper zones by the Bellflower Aquiclude.

Monitoring wells at the Facility are completed in two zones. Most of the wells are completed at or near the water table, at depths of about 55 to 90 feet. Two deeper wells, WCC-1D and WCC-3D, are completed in a deeper zone at about 115 to 140 feet.

Complete records of water-level measurements are included in the quarterly Groundwater Monitoring Summary Reports (Kennedy/Jenks Consultants, 1997a). The hydraulic gradient in the uppermost groundwater is generally toward the south-southeast, toward a local low in the area of wells WCC-7S and WCC-12S. The December 1996 groundwater gradient was 6.6×10^{-6} ft/ft (3.5 ft/mile).

3.0 PROGRAM DESIGN

This section provides the details of the Phase II Soil Characterization program design, the rationale for soil boring placement, and analytical testing on an area-by-area and building-by-building basis.

3.1 Program Design

The soil sampling program was designed to detect COCs throughout the Facility and, as such, is conservative throughout. Additional samples and/or analyses were added to the program, where appropriate, to provide high confidence that COCs would be adequately characterized. Soil sampling locations were placed in known storage or chemical process areas and in previously identified potential areas of concern. Additional soil borings were placed at various spacings to cover open areas and border areas of particular interest.

To best describe the subsurface soils, soil borings were completed to three different nominal depths: 10 feet, 25 feet, and 50 feet bgs. The 10-foot and 25-foot soil borings were completed by direct-push technology and the 50-foot soil borings were completed by hollow-stem auger. Further detail of the drilling methodologies is presented in Section 4.1. Detailed geologic boring logs were made of each soil boring and are presented in Appendix A. All Push borings were continuously cored in their upper 10 feet. A total of fifteen 50-foot soil borings were continuously cored to total depth to provide detailed soils data across the Facility, in addition to the analytical testing.

Field activities were initiated with selection of sampling locations, geophysical screening for underground obstructions, and coring of concrete paving to access subsurface soils. Additional geophysical screening and concrete coring were conducted during the drilling program when new borehole locations were added to the investigation.

Soil samples were collected from 1 foot, 4 feet, and 10 feet bgs in all borings. Where possible, the uppermost soil sample was collected from 6 inches bgs; however, in many instances a 6-inch sample was impractical due to either the deteriorated asphalt at the surface, fill, base materials for concrete, railroad ballast, or because the surface had

been disturbed by building demolition. Soil samples were collected at 5-foot intervals below 10 feet depth in borings drilled to 25 feet bgs and on 10-foot intervals below 10 feet depth in 50 foot boreholes.

The program had one to three drilling rigs collecting soil samples each day and was designed to process approximately 50 to 60 soil samples per day.

Blank samples and confirmation analyses were used for QA in the field program. Daily rinsate blanks were used to check decontamination of sampling equipment. Daily travel blanks accompanied all samples shipped to the stationary laboratory. Ten percent of the samples showing non-detect results for EPA Methods 8260 and 418.1 from the onsite mobile laboratories were sent to the stationary laboratory for confirmatory analysis. In addition, EPA Method 8260 mobile onsite laboratory results exceeding 200 micrograms per kilogram (μg/kg) total VOCs were also sent to the stationary laboratory for confirmation analysis. Split soil samples were also collected by the RWQCB at selected sampling locations. Original laboratory reports are presented in Appendix B.

3.1.1 Sample Identification

Soil samples were identified with a unique boring number and depth using a predetermined nomenclature. For the Area 4 and 5 Soil Characterization, an example identification code is:

2BB-4-5-10

Where

2BB-	study designation
4-	area designation
5-	boring number in that area
10	nominal sample depth.

3.2 Rationale for Sampling Locations and Analytical Testing

The rationale for the sampling locations and analytical testing that follows is based on any of the following factors:

- The locations of known past processes that used specific chemicals.

- The location of specific equipment of concern, such as electrical transformers, clarifiers, ASTs, USTs, and others.

- Locations that border areas of known or suspected contamination.

- Soil samples were also collected and analyzed from areas having no prior history of concern to provide a comprehensive data base on Facility soil conditions for use in the risk assessment.

Sampling locations are shown on Figure 2. The following discussion presents a summary of sampling locations and analytical testing for Areas 4 and 5. Table 1 presents the overall soil sampling analytical program for Areas 4 and 5.

3.2.1 Area 4

Area 4, comprising approximately 4 acres, is the driveway between Building 66 and the eastern border of the C-6 Facility (Figure 2). Topography in Area 4 is essentially flat with an elevation of approximately 50 feet above mean sea level (MSL).

Seven soil borings were drilled in Area 4. Six borings were pushed to a depth of 10 feet bgs, and one (2BB-4-3A) was drilled to a depth of 50 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and sampled for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471) and semivolatile organic compounds (SVOCs) (8270).

3.2.2 Area 5

Area 5, occupies approximately 43 acres comprising the central portion of the C-6 Facility from Building 1 to the western border (Figure 2). The area includes Buildings 1, 32, 29, and 20 east of Denker Avenue, and all of the small buildings west of Denker Avenue between the northwest and southwest parking lots.

3.2.2.1 Building 15, Photo Lab

Building 15 is located in the southwest corner of Area 5, west of Denker Avenue. Historical records show that the building has housed a payroll department, shipping office, and photo laboratory.

One soil boring, 2BB-5-2, was drilled outside the north wall of Building 15 adjacent to where the photo laboratory was located. The boring was pushed to 10 feet. Soil samples were collected according to the depth sheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), Title 22 metals (6010, 7196, and 7471), and cyanide (9010).

3.2.2.2 Border with International Light Metals

Area 5 borders ILM to the west, an area of known soil and groundwater contamination. Railroad tracks are located along the border to the west.

Two borings, 2BB-5-3 and 2BB-5-4, were drilled along the border with the ILM. The borings were drilled to 50 feet bgs using hollow stem auger. Soil samples were collected according to the depth scheme presented in Table 1 and sampled for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), and PCBs (8080).

3.2.2.3 Western Open Space

This area comprises numerous small buildings located west of Denker Avenue, including Buildings 4, 11, 13, 14, 15, 18, 60, 60A, and 60B. The area was investigated to support the Risk Assessment.

Four borings (2BB-5-6 through 2BB-5-9) were drilled at various locations between the buildings. Each boring was pushed to 10 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

3.2.2.4 Building 20

Building 20 is the active vehicle maintenance area of the facility and contains the following: battery recharging area in the north end of the building, a 3-stage clarifier draining a steam cleaning boot, an above ground motor oil tank, hydraulic lifts, and a condensation pit in the southwest corner. Outside the building is an active pump island that dispenses unleaded and regular gas from underground tanks.

All of the borings in the Building 20 area were drilled using direct push. The soil samples were collected according to the depth scheme presented in Table 1. Boring 2BB-5-10 was drilled to 10 feet bgs in the battery recharging area. Soil samples were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), and pH (9045). Boring 2BB-5-11 was drilled to 26 feet bgs near the 3-stage clarifier. Soil samples were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471). Boring 2BB-5-12 was drilled to 25 feet bgs near the above ground motor oil tank. Soil samples were analyzed for VOCs (8260 or 8010/8020) and petroleum hydrocarbons (418.1 and 8015M). Borings 2BB-5-13 and 2BB-5-14 were drilled to 25 feet bgs. Soil samples were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), SVOCs (8270), and PCBs (8080). Boring 2BB-5-16 was drilled to 25 feet bgs near the condensation pit. Boring 2BB-5-15 was cancelled because the proposed boring location was inaccessible to the drilling rig. Soil samples from 2BB-5-16 were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471). Borings 2BB-5-17 through 2BB-5-19 were drilled near the pump island and underground fuel tanks. Borings 2BB-5-18 and 2BB-5-19 were drilled to 25 feet bgs, but 2BB-5-17 was was terminated at 5 feet bgs due to refusal. Soil samples were analyzed for VOCs (8260 or 8010/8020) and petroleum hydrocarbons (418.1 and 8015M).

3.2.2.5 Salvage Area Behind Building 32

Building 32 was built in the 1980s and has been used as a cafeteria and meeting hall. A small salvage yard was maintained just outside the building to the north.

One boring (2BB-5-20) was drilled in the former salvage area behind Building 32. The boring was drilled to 50 feet bgs using a hollow stem auger. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

3.2.2.6 Building 1, Paint Booth

Building 1 is presently used for storage of small tools and records. Historically the building was used as a carbon baking area and for metal finishing. Most of the equipment has been removed and most of the processes took place on the first floor of the building. A painting booth was located in the northeast part of the building.

Two borings (2BB-5-21 and 2BB-5-22) were drilled in the paint booth area. Both borings were pushed to 25 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), SVOCs (8270), and pH (9045).

3.2.2.7 Building 1, Dip Tank Area

In the northwest corner of building 1 is a line of dip tanks. The tanks were used as a chemical processing line that included various acid and water baths for metal aircraft parts.

Three borings (2BB-5-23 through 2BB-5-25) were attempted in the dip tank area. Because of the thick concrete 2BB-5-24 and 2BB-5-25 could not be completed, and were cancelled. Boring 2BB-5-23 was pushed to 25 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), and pH (9045).

3.2.2.8 Building 1, Basement

Building 1 is underlain by a basement that consists of three north-south-trending wings connected by a central corridor. The basement is currently used for office space, and for storage of small molds, dies, and a large quantity of engineering drawings. This area was investigated to support the Risk Assessment.

Eighteen borings (2BB-5-26 through 2BB-5-43) were drilled in the basement of Building 1. The borings were pushed to 10 feet below the base of the 22-inch-thick concrete floor of the basement. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

3.2.2.9 Area Between Buildings 1 and 2

The area between Buildings 1 and 2 has historically been used as a transportation corridor for pedestrians and small vehicles hauling equipment and materials. This area was investigated to support the Risk Assessment.

Five borings (2BB-5-44 through 2BB-5-48) were drilled at regular spacings in the area between buildings 1 and 2. The borings were pushed to 10 feet bgs, except 2BB-5-46 which met refusal at 2 feet. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

4.0 SOIL SAMPLING AND ANALYTICAL METHODS

This section provides the details of the borehole drilling and sampling methods, sample handling and the sample analytical program including QA/QC. Approximately 189 samples were collected in Areas 4 and 5. The field work was conducted during the period from 8 April through 7 May 1997. Areas 4 and 5 soil sampling locations are illustrated on Figure 2.

To accomplish the Phase II Soil Characterization objectives and document proper protocol for the work, a Field Sampling Plan (FSP) was prepared and reviewed with field staff prior to initiating field work. Following the FSP, drilling and sampling methods were conducted in accordance with Kennedy/Jenks Consultants' Standard Operating Guides included in Appendix C. The Guides incorporate industry professional standards for routine sampling, and are designed to meet general regulatory agency requirements and result in litigation-quality work. A Site Health and Safety Plan was also prepared and reviewed with field staff prior to conducting field activities. Field safety meetings were conducted with Kennedy/Jenks Consultants and subcontractor staff at the beginning of each day to review physical and chemical hazards and emergency procedures related to the work.

4.1 Drilling and Soil Sampling

Field activities were initiated with selection of sampling locations, geophysical screening for underground obstructions, and coring of concrete paving to access subsurface soils. Several planned drilling locations as presented to the RWQCB and DTSC in the FSP were moved due to potential underground structures such as pipelines, utility lines, and vaults. The revised plan was approved by the RWQCB and DTSC. Additional geophysical screening and concrete coring were conducted during the drilling program when new borehole locations were added to the investigation.

Sampling was accomplished using direct-push (Geoprobe/Earthprobe), limited access direct-push (XD-1), and hollow-stem auger (CME-85) drilling methods. Direct-push drilling was used on all 10-foot and 25-foot soil borings. The push technology uses a truck-mounted or portable hydraulically driven sampler or core barrel that allows

penetration and standard sampling without the generation of drill cuttings. The sampler for the push tool was fitted with 2-foot-long, 1-inch-diameter Tenite sleeves. No residuals were generated using this equipment. The boreholes were backfilled with a cement-bentonite grout and the surface capped with original material (e.g., concrete, asphalt or native soil). A total of 46 borings throughout Areas 4 and 5 were drilled and sampled using this equipment.

A CME-85 hollow-stem auger drilling rig was used to drill and sample the 50-foot soil borings. Sampling was conducted using a standard split-spoon sampler fitted with 2 1/2-inch-diameter, 6-inch-long brass sleeves. Cuttings from these borings were drummed and the holes were backfilled with a cement-bentonite grout and the surface capped with original material. A total of 4 borings throughout Areas 4 and 5 were drilled and sampled using this technique.

At each of the soil sampling locations, the soil types encountered were logged using the standard Unified Soil Classification System (USCS) and Munsell Color Chart notation. Boring logs are included in Appendix A.

Soil cuttings from hollow-stem auger boreholes were labeled, inventoried, and stored in drums at the Facility for later disposal.

4.2 Sample Handling

Soil samples were collected in Tenite, stainless steel, or brass sleeves and then covered with Teflon™ sheets, capped, labeled, and temporarily stored in ice-cooled containers. For each sampling interval, two or three sleeves (depending on length) were collected for laboratory analysis, one for each of the two mobile laboratories on location and one for the offsite laboratory. Samples were identified with the boring number and depth using the predetermined nomenclature presented in Section 3.1.1.

Samples were immediately labeled, placed in ice-cooled, insulated containers upon collection and transported to the onsite mobile laboratories at the completion of a boring, or transferred to the offsite laboratory by courier at the end of each day. Sample custody was maintained by the field sampler or field supervisor until transferred to one of the

laboratories. Sample custody was documented on standard chain-of-custody forms. Chain-of-custody forms are included with the laboratory reports in Appendix B.

4.3 Sample Analytical Program

Analytical work was conducted by California-certified laboratories using standard EPA test methods and appropriate state-required modifications. Soil samples were analyzed daily in two onsite mobile laboratories. One lab was equipped with two gas chromatography/mass spectrometry (GC/MS) systems with autosamplers capable of performing EPA Method 8260 for VOCs, while a second onsite mobile laboratory analyzed samples for TRPH by EPA Method 418.1 and for diesel by EPA Modified Method 8015. Soil samples were also taken to a stationary laboratory daily by courier for analyses of other COCs, such as semi-volatile organic compounds (SVOCs), metals including hexavalent chromium, PCBs, and others. The stationary laboratory was contracted for additional analyses and for QA/QC backup.

Analytical methods were selected for potential COCs based on the Phase I Preliminary environmental site assessments findings (Kennedy/Jenks Consultants, 1996, 1997a). Analytical methods selected and the number of samples analyzed for each boring are detailed in Table 1 and summarized below:

- All samples, except as noted, were analyzed for VOCs, including gasoline by an onsite mobile laboratory by EPA Method 8260. A limited number of samples collected by the limited access direct-push method were analyzed for VOCs and TRPH at the stationary laboratory by EPA Methods 8010/8020 and 418.1. These samples were collected near the end of the field program after the mobile laboratories had already left the Facility.

- All samples, except as noted, were analyzed for petroleum hydrocarbons by an onsite mobile laboratory by EPA Method 418.1 for TRPH. TRPH detections were also analyzed in the mobile laboratory for hydrocarbon speciation by EPA Method 8015 modified for diesel and heavy hydrocarbons.

- Samples collected at locations with potential metals concerns were analyzed by an offsite laboratory by EPA Methods 6010, 7196, and 7471.

- Samples collected at locations with potential PCB concerns were analyzed by an offsite laboratory by EPA Method 8080.

- Samples collected at locations with potential pesticide concerns were analyzed by an offsite laboratory by EPA Method 8080.

- Ten percent of the mobile laboratory non-detect results by EPA Method 8260 for VOCs were also run by the stationary laboratory as a QA/QC check.

- Ten percent of the mobile laboratory non-detect results by EPA Method 418.1 for TRPH were also run by the stationary laboratory as a QA/QC check.

- Samples with Total VOCs greater than 200 µg/kg detected by EPA Method 8260 in the mobile laboratory were also analyzed for VOCs at the stationary laboratory for confirmation.

5.0 INVESTIGATION RESULTS

This section presents the results of the Phase II Soil Characterization of Areas 4 and 5. The data are discussed by areas in the same order presented in Section 4.0 and Table 1. Each discussion begins with a brief summary of the specific borings associated with each area and the analytical tests performed.

The sections are sub-divided into organic and inorganic data for each location investigated. Organics include the results of analyses for VOCs, petroleum hydrocarbons, SVOCs, PCBs, and pesticides, while the inorganic section focuses on the results of analyses for Title 22 metals. Figures 6A-G, 7A-G, and 8A-G present data for trichloroethene (TCE), 1,1-Dichloroethene (1,1-DCE), and tetrachloroethene (PCE), respectively. Figures 8A-G, 9A, and 10A-G present data for total chromium, arsenic, and lead, respectively. Figures 11A-F summarize the petroleum hydrocarbon detections that occurred around Building 20. Each series of figures includes one to seven members, A through G, that show constituent concentrations detected at the following respective depths: 1 foot, 4 feet, 10 feet, 15 feet and 20 feet, 25 feet and 30 feet, 40 feet, and 50 feet bgs. These compounds and metals were selected as representing the most important COCs detected in Areas 4 and 5 for the ongoing risk assessment and also as the most likely COCs based on the known processes that operated in the area.

Specific Facility-wide ranges of metals in soils and average values are presented in Table 2. References cited for the common range of background metals concentrations in soil include:

- Lindsay, Willard L., 1979, "Chemical Equilibria in Soils," John L. Willey & Sons, New York, New York.

- Shacklette, H.T., and Boerngen, J.G., 1984, "Element Concentrations in Soils and Other Surficial Materials in the Conterminous United States," USGS Professional Paper 1270, U.S. Government Printing Office, Washington, D.C.

Table 3 provides a summary of the VOC results from analyzes performed by the mobile laboratory and stationary laboratory. Table 4 provides TRPH and TPH results from the mobile and stationary laboratories. Table 5 presents the results of the SVOC analyses.

Overall, there were seven background metals detected in all soil samples analyzed (Table 6): 1) barium, 2) total chromium, 3) cobalt, 4) copper, 5) nickel, 6) vanadium, and 7) zinc.

Table 7 presents a summary of analytical results of polychlorinated biphenyls (PCBs) analysis. Table 8 shows the results of pH testing.

5.1 Area 4

Seven soil borings were drilled in Area 4. Six borings were pushed to a depth of 10 feet bgs, and one (2BB-4-3A) was drilled to a depth of 50 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and sampled for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471) and semivolatile organic compounds (SVOCs) (8270). Approximately 25 soil samples were analyzed in Area 4 (Figure 2). Fifty-six percent of the samples showed concentrations greater than detection limits of methods used, with the exception of background metals that were detected in almost every sample.

5.1.1 Organics

No VOCs exceeded the detection limit of 5 μg/kg in the samples from Area 4 (Table 3).

Petroleum hydrocarbons were detected in 13 soil samples collected from six borings (Table 4). TRPH was detected in the 1-foot and 4-foot bgs samples from borings 2BB-4-1, 2, 3, 4, 5, and 6, and in the 10-foot bgs sample from boring 2BB-4-1 . The concentrations ranged from 12 mg/kg in sample 2BB-4-3-4 to 430 mg/kg in sample 2BB-4-6-4, and averaged 117 mg/kg. TPH-E diesel was not detected in any of the samples. TPH-E motor oil was detected in samples from seven of the 13 samples that contained TRPH. The concentrations ranged from 13 to 40 mg/kg in four samples from

borings 2BB-4-4, 5, and 6, and from 210 to 330 mg/kg in three samples from borings 2BB-4-2 and 3.

Bis(2-ethylhexyl)phthalate and phenol were the only SVOCs detected in samples from Area 4 (Table 5). Bis(2-ethylhexyl)phthalate was detected at 190 µg/kg in sample 2BB-4-3A-40. Phenol was detected at 150 µg/kg in sample 2BB-4-3-1.

5.1.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

5.2 Area 5

Forty-three soil borings were drilled and approximately 164 soil samples were analyzed in nine potential areas of concern in Area 5 (Figure 2). Forty-eight percent of the samples showed concentrations greater than detection limits of methods used, with the exception of background metals that were detected in almost every sample. These detections are detailed in the following subsections.

5.2.1 Building 15, Photo Lab

One soil boring, 2BB-5-2, was drilled outside the north wall of Building 15 adjacent to where the photo laboratory was located. The boring was pushed to 10 feet. Soil samples were collected according to the depth sheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), Title 22 metals (6010, 7196, and 7471), and cyanide (9010).

5.2.1.1 Organics

No VOCs exceeded the detection limit of 5 µg/kg in the samples from this area (Table 3).

Petroleum hydrocarbons were detected in one sample from this area. TRPH was detected in sample 2BB-5-2-1 at a concentration of 15 mg/kg (Table 4). TPH-E diesel and motor oil were not detected in any of the samples.

Cyanide was not detected in any of the soil samples from this area, using a detection limit of 0.2 mg/kg.

5.2.1.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

5.2.2 Border with International Light Metals

Two borings, 2BB-5-3 and 2BB-5-4, were drilled along the border with the ILM. The borings were drilled to 50 feet bgs using hollow stem auger. Soil samples were collected according to the depth scheme presented in Table 1 and sampled for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), and PCBs (8080).

5.2.2.1 Organics

TCE was the only VOC that exceeded the detection limit of 5 μg/kg in the samples from this area, and was detected in only two samples (Table 3). Sample 2BB-5-3-40 contained TCE at a concentration of 10 μg/kg, and sample 2BB-5-4-50 contained TCE at 6.5 μg/kg.

Petroleum hydrocarbons were not detected in any of the samples collected from this area (Table 4).

No PCBs were detected in the soil samples collected from this area (Table 7).

5.2.2.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

5.2.3 Western Open Space

Four borings (2BB-5-6 through 2BB-5-9) were drilled at various locations between the buildings. Each boring was pushed to 10 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

5.2.3.1 Organics

No VOCs exceeded the detection limit of 5 μg/kg in the samples from this area (Table 3).

Petroleum hydrocarbons were detected in four samples from two borings drilled in this area (Table 4). TRPH was detected at concentrations of 110 mg/kg and 33 mg/kg in samples 2BB-5-8-1 and 2BB-5-8-4, respectively. TRPH was also detected in boring 2BB-5-9 at 35 mg/kg in the 1-foot sample and at 81 mg/kg in the 4-foot sample . TPH-E diesel was not detected in any of the samples. TPH-E motor oil was detected in sample 2BB-5-8-1 at 29 mg/kg and in sample 2BB-5-9-4 at 27 mg/kg.

5.2.3.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6). Lead was reported at a concentration of 59 mg/kg in sample 2BB-5-7-1. This concentration is well below the TTLC of 1,000 mg/kg, but is greater than ten times the 5.0 mg/l STLC (Table 2).

5.2.4 Building 20

All of the borings in the Building 20 area were drilled using direct push. The soil samples were collected according to the depth scheme presented in Table 1. Boring 2BB-5-10 was drilled to 10 feet bgs in the battery recharging area. Soil samples were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), and pH (9045). Boring 2BB-5-11 was drilled to 26 feet bgs near the 3-stage clarifier. Soil samples were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471). Boring 2BB-5-12 was drilled to 25 feet bgs near the above ground motor oil tank. Soil samples were analyzed for VOCs (8260 or 8010/8020) and petroleum hydrocarbons (418.1 and 8015M). Borings 2BB-5-13 and 2BB-5-14 were drilled to 25 feet bgs. Soil samples were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), SVOCs (8270), and PCBs (8080). Boring 2BB-5-16 was drilled to 25 feet bgs near the condensation pit. Boring 2BB-5-15 was cancelled because the proposed boring location was inaccessible to the drilling rig. Soil samples from 2BB-5-16 were analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471). Borings 2BB-5-17 through 2BB-5-19 were drilled near the pump island and underground fuel tanks. Borings 2BB-5-18 and 2BB-5-19 were drilled to 25 feet bgs, but 2BB-5-17 was was terminated at 5 feet bgs due to refusal. Soil samples were analyzed for VOCs (8260 or 8010/8020) and petroleum hydrocarbons (418.1 and 8015M).

5.2.4.1 Organics

VOCs were detected in only four samples from two borings drilled in this area (Table 3). Gasoline was detected in samples 2BB-5-13-1 at 5,100,000 µg/kg, 2BB-5-16-7 at 300,000 µg/kg, and 2BB-5-16-10 at 530,000 µg/kg. M,p-xylenes were detected in sample 2BB-5-13-4 at 6.4 µg/kg. In addition to gasoline, four other VOCs were detected in sample 2BB-5-13-1. They include ethylbenzene (11,000 µg/kg), toluene (1,200 µg/kg), m,p-xylenes (75,000 µg/kg), and o-xylene (44,000 ug/kg).

Petroleum hydrocarbons were detected in 13 samples from eight borings in this area. Eight of the 13 detections occurred in samples collected from 1 foot or 4 feet bgs. TRPH was detected in the 13 samples at concentrations ranging from 14 mg/kg in sample 2BB-5-13-15 to 23,000 mg/kg in 2BB-5-16-10, and averaging 3,169 mg/kg. TPH-E diesel was detected in two of the 13 samples that contained TRPH. Sample 2BB-5-16-7 contained 18,000 mg/kg diesel, and sample 2BB-5-16-10 contained 15,000 mg/kg diesel. TPH-E motor oil was detected in five of the 13 samples that contained TRPH. Motor oil was detected at concentrations ranging from 120 mg/kg in sample 2BB-5-19-4 to 1,200 mg/kg in sample 2BB-5-17-4, and averaging 382 mg/kg.

Bis(2-ethylhexyl)phthalate was the only SVOC detected in samples from this area (Table 5). It was detected at a concentration of 150 µg/kg in sample 2BB-5-14-25.

PCBs were detected in two samples collected from this area (Table 8). Aroclor-1260 was detected at 100 µg/kg in sample 2BB-5-14-1, and at 160 µg/kg in sample 2BB-5-14-4.

5.2.4.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

The three soil samples collected from boring 2BB-5-10 were tested for pH. The pH values for the 1, 4, and 10-foot samples were 6.4, 7.4, and 8.1, respectively (Table 8).

5.2.5 Salvage Area Behind Building 32

One boring (2BB-5-20) was drilled in the former salvage area behind Building 32. The boring was drilled to 50 feet bgs using a hollow stem auger. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

5.2.5.1 Organics

VOCs were detected in two samples from boring 2BB-5-20 (Table 3). The 1-foot sample contained ethylbenzene at 13 µg/kg, m,p-xylenes at 54 µg/kg, and o-xylenes at 21 µg/kg. TCE was detected in sample 2BB-5-20-50 at a concentration of 26 µg/kg.

Petroleum hydrocarbons were detected in four of the seven samples collected from boring 2BB-5-20 (Table 4). TRPH was detected at concentrations of 9,100 mg/kg in the 1-foot sample, 11 mg/kg in the 4-foot sample, 10 mg/kg in the 10-foot sample, and 15 mg/kg in the 30-foot sample. TPH diesel was not detected in any of the samples that contained TRPH. TPH motor oil was detected only in sample 2BB-5-20-1 at 5,900 mg/kg.

5.2.5.2 Inorganics

The background metals barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6). Additional metals, including arsenic, cadmium, and lead, were detected in the 1-foot sample from boring 2BB-5-20. The concentrations were 170 mg/kg for arsenic, 6.7 mg/kg for cadmium, and 2.8 mg/kg for lead. These metals concentrations are below the TTLCs of 500 mg/kg, 100 mg/kg, and 1,000 mg/kg, respectively. The arsenic concentration, however, is above ten times the STLC of 5 mg/l. None of the other samples contained detectable concentrations of these three metals.

5.2.6 Building 1, Paint Booth

Two borings (2BB-5-21 and 2BB-5-22) were drilled in the paint booth area. Both borings were pushed to 25 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), SVOCs (8270), and pH (9045).

5.2.6.1 Organics

Three VOCs, 1,1-DCE, PCE, and TCE, were detected in nine of the 12 samples collected from borings 2BB-5-21 and 2BB-5-22 (Table 3). 1,1-DCE was detected in the 15, 20, and 25-foot bgs samples from boring 2BB-5-22 at concentrations of 37, 5.8, and 50 μg/kg, respectively. PCE was detected in samples collected from 1, 4, 10, and 20 feet bgs in boring 2BB-5-21, and 1, 4, 15, 20, and 25 feet bgs in boring 2BB-5-22. The concentrations ranged from 5.6 μg/kg in sample 2BB-5-21-20 to 1200 μg/kg in sample 2BB-5-21-1, and averaged 169 μg/kg. TCE was detected in the same samples as PCE was detected in except 2BB-5-21-1 and 2BB-5-21-20. The concentrations of TCE ranged from 5.4 μg/kg in sample 2BB-5-21-10 to 53 μg/kg in sample 2BB-5-22-25, and averaged 19 μg/kg.

Petroleum hydrocarbons were detected in six of the 12 samples collected from borings 2BB-5-21 and 2BB-5-22 (Table 4). TRPH was detected in all six of the samples in concentrations ranging from 19 mg/kg in sample 2BB-5-21-1 to 57 mg/kg in sample 2BB-5-22-4, and averaging 45 mg/kg.

Several SVOCs were detected in the 1-foot bgs samples from borings 2BB-5-21 and 2BB-5-22 (Table 5). These are coal-tar derivatives.

Compound	Concentration (µg/kg)	
	2BB-5-21-1	2BB-5-22-1
Benz(a)anthracene	230	ND
Benzo(b)fluoranthene	410	ND
Benzo(a)pyrene	360	ND
Chrysene	370	160
Fluoranthene	540	200
Indeno(1,2,3-cd)pyrene	270	ND
Phenanthrene	190	ND
Pyrene	420	170

5.2.6.2 Inorganics

The background metals barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6). In addition, lead was detected in sample 2BB-5-22-1 at a concentration of 44 mg/kg. This concentration is well below the TTLC of 1,000 mg/kg and below ten times the STLC of 5 mg/l.

The soil samples collected from borings 2BB-5-21 and 2BB-5-22 were tested for pH (Table 8). The pH values ranged between 7.4 in sample 2BB-5-22-1 to 8.1 in sample 2BB-5-21-1, and averaged 7.7.

5.2.7 Building 1, Dip Tank Area

Three borings (2BB-5-23 through 2BB-5-25) were attempted in the dip tank area. Because of the thick concrete 2BB-5-24 and 2BB-5-25 could not be completed, and were cancelled. Boring 2BB-5-23 was pushed to 25 feet bgs. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), Title 22 metals (6010, 7196, and 7471), and pH (9045).

5.2.7.1 Organics

TCE was the only VOC detected in the samples from boring 2BB-5-23 (Table 3). TCE was detected at concentrations of 5.7 µg/kg in the 10-foot bgs sample, and 7.2 in the 25-foot bgs sample.

Petroleum hydrocarbons were not detected in any of the soil samples from boring 2BB-5-23 (Table 4).

5.2.7.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

pH values for the soil samples in boring 2BB-5-23 ranged from 7.3 in sample 2BB-5-23-4 to 7.9 in sample 2BB-5-23-25, and averaged 7.7 (Table 8).

5.2.8 Building 1, Basement

Eighteen borings (2BB-5-26 through 2BB-5-43) were drilled in the basement of Building 1. The borings were pushed to 10 feet below the base of the 22-inch-thick concrete floor of the basement. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

5.2.8.1 Organics

TCE, 1,1-DCE, and PCE were detected in several of the soil samples collected from this area (Table 3). Most of the detections, though not all, occurred in borings drilled in the east and northeast portions of the basement.

TCE was detected in 30 of the 53 soil samples collected from the basement of Building 1 (Table 3). TCE concentrations ranged from 5.2 µg/kg in sample 2BB-5-42-10 to 150

µg/kg in samples 2BB-5-33-4 and 2BB-5-33-10. The average TCE concentration detected in the 30 samples was 42 µg/kg. 1,1-DCE was detected in 17 of the 53 soil samples from this area. The concentrations of 1,1-DCE ranged from 5.5 µg/kg in sample 2BB-5-40-1 to 69 µg/kg in sample 2BB-5-33-4, and averaged 23 µg/kg. PCE was detected in two of the soil samples. The concentrations of PCE were 5 µg/kg in sample 2BB-5-35-1 and 7.3 µg/kg in sample 2BB-5-40-10.

Petroleum hydrocarbons were not detected in any of the soil samples collected in this area (Table 4).

5.2.8.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

5.2.9 Area Between Buildings 1 and 2

Five borings (2BB-5-44 through 2BB-5-48) were drilled at regular spacings in the area between buildings 1 and 2. The borings were pushed to 10 feet bgs, except 2BB-5-46 which met refusal at 2 feet. Soil samples were collected according to the depth scheme presented in Table 1 and analyzed for VOCs (8260 or 8010/8020), petroleum hydrocarbons (418.1 and 8015M), and Title 22 metals (6010, 7196, and 7471).

5.2.9.1 Organics

TCE was the only VOC detected in soil samples collected from this area (Table 3). TCE was detected in sample 2BB-5-45-1 at 7.5 µg/kg and in sample 2BB-5-46-1 at 8.8 µg/kg.

Petroleum hydrocarbons were detected in seven of the soil samples collected in this area (Table 4). TRPH was detected in the seven samples at concentrations ranging from 11 mg/kg in sample 2BB-5-45-1 to 190 mg/kg in sample 2BB-5-44-1, and averaging 72 mg/kg. TPH diesel was not detected in any of the samples that contained TRPH. TPH motor oil was detected in three of the samples. The concentrations of

motor oil were 98 mg/kg in sample 2BB-5-45-4, 46 mg/kg in sample 2BB-5-48-1, and 50 mg/kg in sample 2BB-5-48-4. None of the 10-foot bgs samples contained detectable concentrations of petroleum hyrdocarbons.

5.2.9.2 Inorganics

The metals analyses were generally typical of the soils in this area. Barium, chromium, cobalt, copper, nickel, vanadium, and zinc were detected at concentrations that appear typical of background values (Tables 2 and 6).

5.3 Quality Assurance Results

This section includes the results of the field quality assurance (QA) sample analysis, travel blanks and equipment rinsate blanks, the 10 percent of non-detect mobile laboratory VOC and TRPH QA results, and the QA check results on mobile laboratory total VOC concentrations greater than 200 µg/kg. In addition, the RWQCB performed audits of the mobile and stationary laboratories and the RWQCB took soil sample splits. Their results matched extremely well with the mobile laboratory data.

5.3.1 Field QA

Daily travel blanks were analyzed for VOCs (8260) to monitor the possibility of outside contamination of soil samples during transport to the stationary laboratory. Travel blank analytical testing resulted in no detections, indicating the samples were not impacted during transport (Appendix B).

Daily equipment rinsate blanks were analyzed to monitor the potential cross-contamination of soil samples by the sampling equipment. All laboratory analytical results were non-detect, indicating proper cleaning of field equipment between samples (Appendix B).

5.3.2 10 Percent Non-Detect Confirmations

5.3.2.1 10 Percent VOC Non-Detects

As an additional QA check on the results of the mobile laboratory, 10 percent of non-detect EPA Method 8260 results were analyzed at the stationary laboratory using EPA 8010/8020. Comparison of the data are presented in Table 9. The stationary laboratory confirmed the mobile laboratory results by not detecting any VOCs in the samples tested.

5.3.2.2 10 Percent TRPH Non-Detects

As an additional QA check on the results of the mobile laboratory, 10 percent of non-detect EPA Method 418.1 results were analyzed at the stationary laboratory. Comparison of the data are presented in Table 10.

The stationary laboratory results showed detections of TRPH by EPA Method 418.1 in seven out of 17 samples (~41 percent). However, the mobile laboratory used a screening detection limit of 20 mg/kg during the beginning of the program and then, on request by Kennedy/Jenks Consultants, changed to a detection limit of 10 mg/kg. The stationary laboratory used a detection limit of 8 mg/kg. TRPH was detected in the 17 samples at concentrations no greater than 42 mg/kg. This variability is not unreasonable when comparing the results of analyses of separate soil sample sleeves from the same sampling location. Due to the inhomogeneous nature of the sediments, chemical concentrations could vary widely, even within the same 6-inch sample sleeve.

Because of the difficulty inherent in analyzing duplicate soil samples, the QA data are interpreted to show acceptable correlation between the analyses and essentially confirm the mobile laboratory results.

5.3.3 QA Analysis of Total VOC>200 μg/kg

The purpose of the QA analysis of total VOC>200 μg/kg was to confirm the mobile lab screening results. Three soil samples collected from Areas 4 and 5 contained greater

than 200 µg/kg total VOCs, and were analyzed at the stationary labory using EPA Method 8010/8020 (Table 11).

Ethylbenzene, toluene, and xylenes were detected in sample 2BB-5-13-1 by the mobile lab in concentrations of 11,000 µg/kg, 1,200 µg/kg, and 119,000 µg/kg, respectively. Xylenes were detected by the stationary lab in this sample at a much lower concentration of 3.3 µg/kg. In addition, 1,2,4-trimethylbenzene, 1,2,4-trichlorobenzene, and 1,2,3-trichlorobenzene were detected by the stationary lab at concentrations of 2.9 µg/kg, 4.0 µg/kg, and 3.9 µg/kg, respectively.

Samples 2BB-5-33-4 and 2BB-5-33-10 were analyzed at the stationary laboratory because the mobile laboratory detected 1-1, DCE and TCE in cumulative concentrations exceeding 200 µg/kg in both samples. The stationary laboratory only detected TCE in sample 2BB-5-33-10 at a concentration of 8.6 µg/kg.

This variability is not unreasonable when comparing the results of analyses of separate soil sample sleeves from the same sampling location. Due to the inhomogeneous nature of the sediments, chemical concentrations could vary widely, even within the same 6-inch sample sleeve. Because of the difficulty inherent in analyzing duplicate soil samples, the QA data are interpreted to show acceptable correlation between the analyses and essentially confirm the mobile laboratory results.

6.0 CONCLUSIONS

The Phase II Soil Characterization of Areas 4 and 5 was completed according to the Field Sampling Plan (FSP) that was developed from the Phase I environmental site assessments of the Facility and reviewed and approved by the RWQCB and DTSC. The data generated during this program will provide support to develop the risk assessment, function as part of future groundwater investigations, and as input to future remediation and feasibility studies.

Area 4 was investigated as a single area of potential concern. Area 5 was divided into the following nine areas of potential concern which were investigated separately:

- Building 15, Photo Lab
- Border with International Light Metals
- Open Space west of Denker Avenue
- Building 20, Auto Repair Shop
- Salvage Area Behind Building 32
- Building 1, Paint Booth
- Building 1, Dip Tank Area
- Building 1, Basement
- Area Between Buildings 1 and 2

This section of the report begins with a brief description of the field program (Section 6.1), followed by a summary of subsurface soil conditions at the Facility (Section 6.2). Findings regarding areas of concern identified in this study are summarized in Section 6.3. Section 6.4 presents a discussion of other notable findings that were not significant enough to identify an area of concern.

6.1 Field Program

The field program included drilling and geologic logging of 50 soil borings and collecting 189 soil samples in Areas 4 and 5. The soil samples were analyzed for the COCs that could be present in each area of potential concern. The samples were analyzed for VOCs and petroleum hydrocarbons by an onsite state-certified laboratory. Selected

samples also were analyzed at an offsite state-certified stationary laboratory for one or more additional parameters, including, but not limited to, SVOCs, PCBs, metals, cyanide, and pH.

The QA program included blank samples and confirmation analyses of selected soil samples. Analyses of the blank samples showed no indication that soil samples were inadvertently contaminated. Confirmation analyses at a stationary laboratory supported the mobile laboratory analyses. In addition, both the mobile and stationary laboratories were audited by the RWQCB for compliance with analysis procedure methods.

6.2 Subsurface Soils

Extensive information regarding the soils within 50 feet bgs at the Facility was developed from the drilling and geologic logging in the Phase II Soil Characterization. Four distinct subsurface units were identified. Three of these were correlated over the entire Facility, while the fourth pinches out on the northwest and dips below the depth drilled on the eastern portion of the property. The uppermost soils at the Facility consist predominantly of clay and silt. These fine-grained soils are present to about 22 feet bgs on the west and thicken to about 45 feet bgs on the east. Soils below these depths are predominantly sand and silty sand to the 50-foot maximum depth drilled.

6.3 Areas of Concern

Analysis of the results of the Phase II Soil Characterization indicated that Building 20 is the one area of concern within Areas 4 and 5.

Several soil samples collected from the Building 20 borings were impacted with petroleum hydrocarbons. Gasoline was detected in three samples with the concentrations ranging from 300,000 µg/kg to 5,100,000 µg/kg. The gasoline impact detected in the 1-foot bgs sample from boring 2BB-5-13 appears to be limited in extent because it was not detected in the samples from the nearby borings 2BB-5-14 and 2BB-5-12, nor was it detected in deeper samples from boring 2BB-5-13. The gasoline detected in the 7-foot and 10-foot bgs samples from boring 2BB-5-16 appears to be limited in vertical extent because the 15-foot sample did not contain detectable

concentrations of gasoline. The lateral extent of the gasoline impact, however, is not well constrained around boring 2BB-5-16. TRPH was also detected in shallow samples from borings 2BB-5-12, 13, 14, 16, 17, and 19 in concentrations ranging from 14 mg/kg to 23,000 mg/kg. TPH motor oil was detected in shallow samples from borings 2BB-5-16, 17, and 19 in concentrations no greater than 1,200 mg/kg. TPH diesel was detected in the 7-foot and 10-foot samples from boring 2BB-5-16 at 18,000 and 15,000 mg/kg, respectively.

6.4 Summary of Results by Area

6.4.1 Area 4

Analysis of the results of the Phase II Soil Characterization indicated that there are no areas of concern in Area 4, the driveway between Building 66 and the eastern border of the C-6 Facility. While petroleum hydrocarbons were found in many of the samples collected from this area, the detections occurred in shallow samples, and the concentrations were no greater than 430 mg/kg. This area did not contain petroleum hydrocarbons in concentrations, distribution, or frequency of occurrence to be designated as an area of concern.

6.4.2 Border with International Light Metals

Low concentrations of TCE were detected in the 40-foot sample and the 50-foot sample from borings 2BB-5-3 and 2BB-5-4, respectively. The presence of TCE in these samples is consistent with the findings of other soil borings along the border which are described in the Parcel A Phase II Soil Characterization report (Kennedy/Jenks, 1997). The TCE may have migrated from documented sources of TCE impact on the adjacent ILM property.

6.4.3 Building 20

The automotive repair shop, Building 20 was identified as an area of concern. The results of the investigation in this area are discussed in Section 6.3.

6.4.4 Building 1, Basement and Paint Booth

The soil beneath the basement of Building 1, particularly the eastern and northeastern parts, has been impacted with VOCs including TCE, 1,1-DCE, and PCE. The impacts observed in the basement and paint booth borings appear to be the result of releases centered around Building 36 to the north. The results of investigation in the area of Building 36 are described in the Phase II Soil Characterization Report for Parcel A (Kennedy/Jenks, 1997b).

6.4.5 Salvage Area Behind Building 32

Samples collected from boring 2BB-5-20, located in the salvage area north of Building 32, contained petroleum hydrocarbons. While the 1-foot sample contained TRPH at 9,100 mg/kg, the 4, 10, and 30-foot samples contained TRPH no greater than 15 mg/kg. In addition, the 1-foot sample contained arsenic at a concentration of 170 mg/kg as well as low concentrations of cadmium and lead. This area did not contain petroleum hydrocarbons or metals in concentrations, distribution, or frequency of occurrence to be designated as an area of concern.

None of the other areas of potential concern investigated in Area 5 were found to contain COCs at levels such that they were designated areas of concern.

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